Generator

Source for generation of electric energy

Generator made small in size and lightweight

Generally, "three-phase alternating current synchronous generator" is combined in generation of electric power for service cogeneration.

Constructional example of generator

Synchronous generators generally adopt a system, in which a rotating-armature type alternating current excitor for direct-current excitation of a field coil is provided on the same shaft and its output is converted into direct current by a silicon diode to be fed to the coil.

① stator coil: receiving a rotating magnetic field to generate voltage to send a load current

② field coil: generating a rotating magnetic field (main magnetic flux)

③ alternating current excitor: generating electric power for main magnetic flux

④ silicon diode: converting an alternating current power generated by an alternating current excitor into a direct current power

⑤ coupling: connected directly to a prime mover to transmit power

⑥ bearing: supporting a weight of a rotating section to rotate it stably

⑦ fan: mounted on a rotating section to flow a cooling air

a: stator iron core

b: rotor iron core

c: amortisation winding

d: number of poles

e: construction and waveform

f: four poles

g: six poles

h: conductor

i: revolution

j: Principle of three-phase alternating current synchronous generator

k: electromotive force

l: cycle

m: cycle

n: time

o: waveform of three-phase electromotive force

p: generator voltage

q: detection unit

r: set voltage

s: voltage setter

t: control unit

u: amplification unit

v: generator

w: Principle of AVR

Main specification

generator

number of revolution and number of poles

Frequency and rotational speed in a generator are related to each other in the following formula.

where f: frequency (Hz), Ns: rotational speed (min^{-1}), and P: number of poles

Three-phase electromotive force

Three-phase alternating current synchronous generator comprises three conductors A, B, C disposed at 120° intervals in a stator iron core, and when a magnet (rotor iron core) is rotated in the conductors, electromotive forces, respectively, shifted 1/3 cycle are generated in the respective conductors.

Electromotive forces generated in the A, B, C conductors are integrated to be called a three-phase electromotive force.

AVR: Automatic Voltage Regulator

An output voltage is varied depending upon variation in load on an electrical machine and temperature changes in respective sections. A device for automatically controlling an exciting current to correct a generated electric power to a constant magnitude in order to prevent such variation is an automatic voltage regulator.

A deviation between a generator voltage and a set voltage is detected, a control unit sends a signal, and an amplification unit controls an exciting current to make a generated electric power constant.